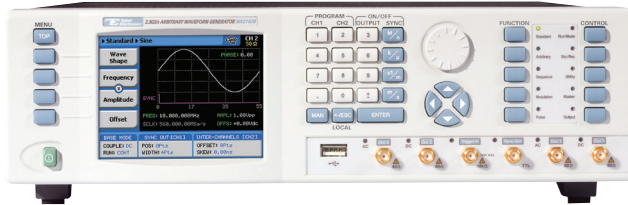


# MODELS SE5082

## 5GS/s Dual Channels Arbitrary Waveform Generators



- Dual channel 5Gs/s, 12 bit waveform generators
- Extra wide analog bandwidth of more than 7GHz
- Extremely fast rise and fall time of under 100ps
- Multi-Nyquist zone operation, up to the 4th Nyquist zone
- NRZ, NRTZ, RTZ and RF modes for optimized performance
- Inter-channel control from -3ns to +3ns with 10ps resolution
- Independent or synchronized channels configurations
- 16M waveform memory, 64M memory
- AM, FM, FSK, PSK, ASK, Amp. Hop, Freq. Hop, Sweep & Chirp
- Powerful pulse composer for analog, digital and mixed signals
- Various outpvcanced sequencer for step, loop, nest and jumps scenarios
- Built-in fast dynamic segments and sequences hop control
- Two differential markers per channel with programmable positions, width and levels
- User friendly GUI & Remote control through LAN, USB & GPIB
- Store/recall capability on disk-on-key or 4GB internal memory
- Multi instrument synchronization

The new Signal Expert Series sets new standards for high speed arbitrary waveform generators. With an analog bandwidth of more than 7 GHz, the new Signal Expert Series can reach frequencies much higher than its sampling rate. Combining this vast analog bandwidth with multi Nyquist zone operation the Signal Expert Series is capable of solving applications well beyond baseband and into the microwave frequencies. This new technology combined with advanced arbitrary and sequencing capabilities, excellent spectral purity, configurable output modules, and advanced triggering make the new Signal Expert Series the highest performing and most cost effective AWG of its class and even beyond.

### Multi-Nyquist Operation

Traditionally AWGs work only in the first Nyquist zone as signals in the higher Nyquist zones are suppressed, due to bandwidth and architecture limitations. But what if these signals were not suppressed? This would mean that with the proper filter it would be possible to generate signals well above

the sampling rate of the AWG. Utilizing new technology, the Signal Expert Series offers different sampling modes that optimize performance according to the Nyquist zone of interest. Coupled with the proper output module users can generate signals more than 7GHz and well into the microwave C-band area, all the while keeping excellent signal purity.

### Configurable Outputs Modules

Different applications require different output paths. This is why the Signal Expert Series offers a selection of various factory configured output modules. Each output module offers a different amplifier path, utilizing benefits which would match your specific application need. For example, the High Voltage module, which offers 3Vpp into 50Ω and up to 1GHz bandwidth, is utilized for various time domain applications, while for applications that require clean, direct IF/RF generation, one can order the DAC AC output module, which has a fixed 0dBm and 6GHz of bandwidth for exceptional spectral purity. Another example is the High

Bandwidth module, which offers 1Vpp with an unprecedented 9GHz of bandwidth utilizing the SE5082 full 7GHz bandwidth and offering a rise and fall time below 100ps. Other output modules will be made available soon, so feel free to share with us your requirements so that we can try and meet your application needs.

### Signal Integrity and Purity

One of the most important requirement in today's testing and measurement applications is high signal quality. With a typical SSB phase noise of <-115dBc at 100MHz, and <-95dBc at 1GHz, at 10 kHz carrier offset and with exceptionally good SFDR of <-70dBc at 1GHz carrier, Tabor's Signal Expert Series' unique platform delivers one of the best quality signals available on the market today, answering the ever-growing demand for clear and precise signals.

# MODELS SE5082

## 5GS/s Dual Channels Arbitrary Waveform Generators

### **IQ Generation**

The ability to generate IQ signals is fundamental for any RF or communication engineer. With the advanced arbitrary capabilities and highly synchronized channels, the SE is ideal for generating digital modulations. The new Signal Expert Series offers excellent EVM performance even at 1.8GHz IQ bandwidth with less than 1% EVM for a 16QAM modulation, making it, by far, the best performance for price IQ source available in the market today.

### **Common or Separate Clocks**

Need a four, dual or a single channel unit... why choose? With the new Signal Expert Series you can have it all. The Signal Expert Series has up to four output channels, which can either operate independently, or synchronized to share the same sample clock source. As separate channels, one has the advantage of having up to four separate instruments in one box, with each having the ability to be programmed to output different function shapes, frequency, amplitude levels and/or to operate in different run modes. Alternatively, the advantage of having synchronized channels with less than 10ps skew and skew control is very significant in applications that require an accurate and controlled phase between the channels, which is ideal for many X-Y modes and I&Q output applications.

### **Smart Trigger**

Until now, you've been forced to trigger on a specific event. Tabor's all-new SmarTrigger feature was designed to enhance the trigger capability and facilitate wider flexibility of a specific pulse event. It allows triggering on either a pulse having a larger pulse width than a programmed time value (time), or even on a pulse having a pulse width between two limits (<>time). In addition, the SmarTrigger has a hold-off function, in which the output is held idle after the first trigger and starts a waveform cycle only with the first valid trigger after a hold-off interval has lapsed, allowing you to solve endless "negotiation" scenarios.

### **Powerful Segmentation and Sequencing**

Solving almost every complex application, powerful segmentation and sequencing produces a nearly endless variety of complex waveforms. The waveform memory can be divided into multiple waveform segments and sequenced in user-selectable fashion to create complex waveforms that have repeatable segments, jump and nest, saving you precious memory space. The Signal Expert also allows you to generate up to 1000 sequence scenarios and sequence between them to generate an even higher level of flexibility in waveform creation.

### **Programmable Differential Markers**

The Signal Expert series is equipped with two programmable differential markers per channel. Differential simply means outstanding signal integrity for high frequencies, whereas the programmability allows you to set position, width, delay and amplitude for any required peripheral triggering need. While bench usage enables setting only one marker position, you can set multiple markers and program different marker properties for each transition instance remotely, allowing various triggering profiles.

### **Pulse / Pattern Creation**

Generating complex pulse trains has never been easier. The Pulse Composer is a powerful built-in tool that converts the Signal Expert Series to a very sophisticated Pulse/Pattern Generator, allowing to create literally any complex pulse train / pattern, whether it's a single pulse, multi-level, linear-points, initialization or preamble pattern definition, user-defined or even standard random patterns with programmable resolution, so it doesn't matter if your application is radar communications, nanotechnology or serial bus testing, the pulse/pattern composer is the right tool for your application. Moreover, all the Signal Expert Series advanced trigger modes are applicable, hence one can choose to use the "step" mode to advance every bit independently or the "once" mode to advance a complete data block in one trigger event, enabling even more applications, such as trigger, clock and data protocols.

### **Dynamic Segment / Sequence Control**

Working in the real-time world and need fast waveform switching? The Signal Expert series has a rear panel control designed specifically for that. Having the dynamic control feature, in effect, can serve as replacement of the sequence table where the real-time application can decide when and for how long a waveform will be generated. For much more complex applications, this same input may serve as a dynamic switch for complete sequences, creating real-life scenarios for real-time applications.

### **Multiple Environments to Write Your Code**

The Signal Expert Series comes with a complete set of drivers, allowing you to write your application in various environments including Labview, CVI, C++, VB and MATLAB. You may also link the supplied dll to other Windows-based API's or use low-level SCPI commands to program the instrument, regardless of whether your application is written for Windows, Linux or Macintosh operating systems.

### **Easy to Use**

Large and user-friendly 4" backlit color LCD display facilitates browsing through menus, updating parameters and displaying detailed and critical information for your waveform output. Combined with numeric keypad, ten quick-link function & run mode buttons, cursor position control and a dial, the front panel controls simplify the often complex operation of an arbitrary waveform generator.

### **ArbConnection**

ArbConnection is a powerful software package that allows you to easily design any type of waveform and control the instrument functions, modes and features via a graphical user interface (GUI). Whether you need to generate output using a built-in waveform, a hand sketched or played back waveform, a pulse pattern, a serial data string, a modulated carrier or even an equation, ArbConnection provides you the editing tool which makes virtually any application possible.

# MODELS SE5082

## 5GS/s Dual Channels Arbitrary Waveform Generators Specification

### CONFIGURATION

Output Channels 1/2, Synchronized/fully separated

### STANDARD WAVEFORMS

Type: Sine, triangle, square, ramp, pulse, sin(x)/x, exponential rise, exponential decay, gaussian, noise and DC.

### Frequency Range:

Sine 1μHz to 1GHz  
Square, Pulse 1μHz to 500MHz  
All others 1μHz to 250MHz

### SINE

Start Phase: 0 to 360°

Phase Resolution: 0.01°

Harmonics Distortion (typ.):  
DC 1Vpp AC 0dBm

5MHz to 200MHz	<-44dBc <sup>(1)</sup>	<-40dBc
200MHz to 375MHz	<-40dBc <sup>(1)</sup>	<-40dBc
375MHz to 500MHz	<-35dBc <sup>(1)</sup>	<-50dBc
500MHz to 700MHz	<-32dBc <sup>(1)</sup>	<-55dBc
700MHz to 1GHz	<-70dBc <sup>(1)</sup>	<-70dBc

<sup>(1)</sup> Measured with 1GHz lowpass filter

### Non-Harmonics Distortion (typ.):

1MHz to 100MHz	<-80dBc
100MHz to 250MHz	<-75dBc
250MHz to 500MHz	<-70dBc
500MHz to 1GHz	<-65dBc

### SSB Phase Noise (10kHz offset):

1MHz Carrier	<-120dBc/Hz
10MHz Carrier	<-118dBc/Hz
100MHz Carrier	<-115dBc/Hz
250MHz Carrier	<-108dBc/Hz
500MHz Carrier	<-100dBc/Hz
1GHz Carrier	<-95dBc/Hz

### Flatness (AC Path):

Cross Range ±0.5dB

### PULSE

Pulse Mode: Single or double, programmable  
Polarity: Normal, inverted or complement  
Period: 2ns to 1.6s  
Resolution: 500ps  
Pulse Width: 1ns to 1.6s  
Rise/Fall Time:  
DC Path 600ps (typical < 500ps)  
Linear 1ns to 1.6s  
Delay: 1ns to 1.6s  
Double Pulse Delay: 1ns to 1.6s  
Amplitude:  
Range  
DC Path 50mVp-p to 2Vp-p into 50Ω  
Levels  
Low Level -1V to +0.95V  
High Level -0.95V to +1V

### NOTES:

1. All pulse parameters, except rise and fall times, may be freely programmed within the selected pulse period provided that the ratio between the

period and the smallest incremental unit does not exceed the ratio of 16,000,000 to 1.

2. Rise and fall times, may be freely programmed provided that the ratio between the rise/fall time and the smallest incremental unit does not exceed the ratio of 1,000,000 to 1.

3. The sum of all pulse parameters must not exceed the pulse period setting.

### PULSE / PATTERN COMPOSER

#### MULTI-LEVEL / LINEAR-POINTS

Number of Levels: 1 to 1000  
Dwell Time: 500ps to 1s  
Transition type: Fast or Linear  
Memory: 100k  
Amp. Resolution: 4 digits  
Time Resolution: 500ps to 100ns (auto or user)

#### PATTERN

Pattern Source: PRBS or user-defined  
PRBS Type: PRBS7, PRBS9, PRBS11, PRBS15, PRBS23, PRBS31, USER

Data Rate: 1Bit/s to 500MBit/s

Number of Levels: 2, 3, 4, 5

High/Low Levels: ±2V

Resolution: 4 digits

Loops: 1 to 1e6

Preamble: 1 to 16e6

Length: 2 to 16e6

### ARBITRARY WAVEFORMS

Sample Rate: 50MS/s to 5GS/s (6GS/s typical)  
Vertical Resolution: 12 bits  
Waveform Memory: 32M/64M points optional  
Min. Segment Size: 384points  
Resolution: 32points  
No. of Segments: 1 to 32k  
Waveform Granularity: 1 point  
Dynamic control: Software command or rear panel segment control port

Jump Timing: Coherent or asynchronous

### SEQUENCED WAVEFORMS

Multi Sequence: 1 to 1,000 unique scenarios  
Sequencer Steps: 1 to 48k steps.  
Segment Loops: 1 to 16M cycles, each segment  
Sequence Loops: 1 to 1M ("Once" mode only)  
Step Advance Modes: Continuous, once (x "N") and stepped

### SEQUENCED SEQUENCES

Sequence Scenarios: 1 Scenario  
Dynamic Control: Software command or rear panel sequence control port  
Table Length: 1 to 1k steps

Advance Control: Continuous, once and stepped  
Sequence Loops: 1 to 1,000,000 cycles

### MODULATION

#### COMMON CHARACTERISTICS

Carrier Waveform: Sine, square, triangle  
Carrier Frequency: 10kHz to 1GHz  
Modulation Source: Internal

#### FM

Modulation Shape: Sine, square, triangle, ramp  
Modulation Freq.: 100Hz to 100MHz  
Deviation Range: 10mHz to 500MHz

#### FSK / FREQUENCY HOPPING

FSK Baud Rate: 10mbps to 500Mbps  
Hop Table Size: 2 to 256  
Hop Type: Fast or Linear  
Dwell Time Mode: Fixed or programmable per step  
Dwell Time: 2ns to 10s  
Dwell Time Res.: 2ns

#### SWEEP / CHIRP

Sweep Type: Linear or log  
Sweep Direction: Up or down  
Sweep Time: 1.4 μs to 10ms  
Modulation Shape: Pulse  
Pulse Repetition:  
Range 200ns to 20s  
Resolution 3 digits  
Accuracy 100ppm

#### AM

Modulation Shape: Sine, square, triangle, ramp  
Modulation Freq.: 100Hz to 1MHz  
Modulation Depth: 0.1 to 200%

#### ASK / AMPLITUDE HOPPING

ASK Baud Rate: 10mbps to 500Mbps  
Hop Table Size: 2 to 256  
Hop Type: Fast or Linear  
Dwell Time Mode: Fixed or programmable per step  
Dwell Time: 2ns to 10s  
Resolution 2ns  
(n)PSK and (n)QAM

Modulation Type: PSK, BPSK, QPSK, OQPSK, PI/4 DQPSK, 8PSK, 16PSK, 16QAM, 64QAM, 256QAM and User Defined

Symbol Rate Range: 10mbps to 500Mbps  
Symbol Accuracy: 1ppm  
Table Size: 2 to 256

# MODELS SE5082

## 5GS/s Dual Channels Arbitrary Waveform Generators

### Specification

#### COMMON CHARACTERISTICS

##### FREQUENCY

Resolution: 12 digits  
Accuracy/Stability: Same as reference

##### ACCURACY REFERENCE CLOCK

Internal 1 ppm from 19°C to 29°C;  
1ppm/°C below 19°C or above  
29°C; 1 ppm/year aging rate  
External Same as accuracy and  
stability of the external ref.

#### OUTPUTS

##### MAIN OUTPUTS

Coupling: DC-coupled, or AC-coupled  
Connectors: Front panel SMAs  
Impedance: 50Ω nominal, each output  
Protection: Protected against temporary  
short to case ground

##### DC-COUPLED

Type: Single-ended or differential  
Resolution: 4 digits  
Accuracy: ±(2% +2 mV), offset = 0V  
Overshoot: 5%, typical

##### DC PATH

Rise/Fall Time: <600ps (typical <500ps)  
Amplitude Range:  
Single-ended 50mVp-p to 2Vp-p\*  
Differential 100mVp-p to 4Vp-p\*

##### OFFSET

Offset Range: -1.5V to +1.5V into 50Ω  
Offset Resolution: 4 digits  
Offset Accuracy: ±2% + 15mV

##### DIRECT (DAC), AC-COUPLED

Type: Single-ended  
Amplitude Range: -20dBm to +10dBm into 50Ω,  
Resolution: 4 digits  
Accuracy: ±(3% +0.5dBm)  
Bandwidth: 1GHz

##### MARKER OUTPUTS

Number of Markers: Two markers per channel  
Type: Differential (+) and (-) outputs  
Connectors: SMB  
Skew Between Markers: 100ps, typical  
Impedance: 50Ω  
Amplitude Voltage:  
Window 0V to 1.25V, single-ended; 0V  
to 2.5V, differential

Low level 0V to 0.8V, single-ended;  
0V to 1.6V, differential  
High level 0.5V to 1.25V, single-ended;  
0V to 2.5V, differential  
Resolution: 10mV  
Accuracy: 10% of setting  
Width control: 2 SCLK to segment length;  
Position control:  
Range 0 to segment length  
Resolution 2 points  
Initial delay: 4ns±½ clock (Output to marker)  
Variable delay:  
Control Separate for each channel  
Range 0 to 3ns  
Resolution 10ps  
Accuracy ±(10% of setting +20ps)  
Rise/Fall Time: <1ns, typical

#### DIGITAL OUTPUTS (OPTION D)

Number of Bits: 32 output channels  
Type: Differential (+) and (-) outputs  
Connectors: High speed I/O receptacle,  
68-pin VRDPC  
Skew Between Bits: 100ps, typical  
Level: LVDS  
Impedance: 100Ω  
Max. Data Rate: 1.15Gb/s  
Pattern Memory: Up to 16MWord  
Source Dedicated or parallel

#### SYNC OUTPUT

Connector: Front panel SMA  
Source: Channel 1 or channel 2  
Type: Single ended  
Waveform Type:  
Pulse 16 points width  
WCOM Waveform complete  
Impedance: 50Ω  
Amplitude: 1V; doubles into high impedance  
Variable Position Control:  
Range 0 to segment length  
Resolution 16 points  
Rise/Fall Time 2ns, typical  
Variable Width control:  
Range 16 points to segment length  
Resolution 16 points

#### INPUTS

##### TRIGGER INPUT

Connector: Front panel SMA  
Input Impedance: 1kΩ or 50Ω, selectable  
Polarity: Positive, negative, or both  
Damage Level: ±20Vdc  
Frequency Range: 0 to 15MHz  
Trigger Level Control:

Range -5V to 5V into 50Ω;  
-10V to 10V into 1kΩ  
Resolution 12 bit (2.5mV)  
Accuracy ±(5% of setting + 2.5mV)  
Sensitivity 0.2Vp-p  
Min. Pulse Width: 10 ns

#### EVENT INPUT

Connector: Rear panel BNC  
Input Impedance: 10kΩ or 2.2kΩ pull up to +5V  
Polarity: Positive, negative or either  
Damage Level: ±20Vdc  
Frequency Range: 0 to 15MHz  
Trigger Level Control:  
Range -5V to 5V  
Resolution 12 bit (2.5mV)  
Accuracy ±(5% of setting + 2.5mV)  
Sensitivity 0.2 Vp-p minimum  
Min. Pulse Width: 10 ns

#### SEQUENCE/SEGMENT CONTROL INPUT

Connectors: Rear panel D-sub, 8 bit lines  
Input Impedance: 10kΩ  
Input Level: TTL

#### EXTERNAL REFERENCE INPUT

Connector: Rear panel BNC  
Input Frequency: 10 MHz to 100 MHz, programmable  
Input Impedance: 50Ω  
Voltage Swing: -5dBm to 5dBm  
Damage Level: 10dBm

#### EXTERNAL SAMPLE CLOCK INPUT

Connector: Rear panel SMA  
Input Impedance: 50Ω  
Voltage Swing: 0dBm to 10dBm  
Input Frequency: 10MHz to 2.3GHz  
Clock Divider: 1/1, 1/2, 1/4, 1/256,  
separate for each channel  
Damage Level: 15dBm  
Input Voltage Range:  
AC 0.25Vp-p to 1Vp-p  
DC ±10V max.

# MODELS SE5082

## 5GS/s Dual Channels Arbitrary Waveform Generators

### Specification

#### RUN MODES

<b>Continuous:</b>	A selected output function shape is output continuously.
<b>Self Armed:</b>	No start commands are required to generate waveforms.
<b>Armed:</b>	The output dwells on a DC level and waits for an enable command and then the output waveform is output continuously; An abort command turns off the waveform.
<b>Triggered:</b>	A trigger signal activates a single-shot or counted burst of output waveforms and then the instrument waits for the next trigger signal.
<b>Normal Mode</b>	The first trigger signal activates the output; consecutive triggers are ignored for the duration of the output waveform.
<b>Override Mode:</b>	The first trigger signal activates the output; consecutive triggers restart the output waveform regardless if the current waveform has been completed or not.
<b>Gated:</b>	A waveform is output when a gate signal is asserted. The waveform is repeated until the gate signal is de-asserted. Last period is always completed.
<b>Burst:</b>	Upon trigger, outputs a Dual or multiple pre-programmed number of waveform cycles from 1 through 1M.

#### TRIGGER CHARACTERISTICS

##### EXTERNAL

<b>Source:</b>	Channel 1, channel 2, or both
<b>Connector:</b>	SMA
<b>Input Impedance:</b>	1k $\Omega$ or 50 $\Omega$ , selectable
<b>Polarity:</b>	Positive, negative, or both
<b>Damage Level:</b>	$\pm$ 20Vdc
<b>Frequency Range:</b>	0 to 15MHz
<b>Trigger Level Control:</b>	
Range	-5V to 5V into 50 $\Omega$ ; -10V to 10V into 1k $\Omega$
Resolution	12 bit (2.5mV)
Accuracy	$\pm$ (5% of setting + 2.5mV)
Sensitivity	0.2Vp-p
<b>Pulse Width:</b>	10 ns, minimum
<b>System Delay:</b>	200 SCLK periods + 50ns
<b>Trigger Delay:</b>	Separate for each channel
Range	0 to 8,000,000 SCLK periods
Resolution	4 points
Accuracy	Same as SCLK accuracy

<b>Smart Trigger:</b>	Detects a unique pulse width
<b>Conditioned Trigger:</b>	< pulse width, > pulse width or < > pulse width
Pulse Width Range	50ns to 2s
Resolution	2ns
Accuracy	$\pm$ (5% of setting + 20ns)
<b>Trigger Hold-off:</b>	Ignores triggers for a hold-off
Hold-off range	100ns to 2s
Resolution	2ns
Accuracy	$\pm$ (5% of setting + 20ns)
<b>Trigger jitter:</b>	4 SCLK periods

##### INTERNAL

<b>Source:</b>	Common or separate
<b>Modes:</b>	
Timer	Waveform start to waveform start
Delayed	Waveform stop to waveform start
<b>Timer:</b>	
Range	200ns to 10s
Resolution	3 digits
Accuracy	100ppm
<b>Delay</b>	
Range	152 to 8,000,000 SCLK periods
Resolution	Even numbers, divisible by 4

##### MANUAL

<b>Source:</b>	Soft trigger command from the front panel or remote
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##### INTER-CHANNEL SKEW CONTROL

##### COURSE TUNING

<b>Initial skew:</b>	200ps
<b>Control:</b>	
Range	0 to waveform-length points
Resolution	4 points
<b>Accuracy:</b>	Same as SCLK accuracy

##### FINE TUNING

<b>Initial skew:</b>	200ps
<b>Control:</b>	
Range	-3ns to +3ns
Resolution	10ps
<b>Accuracy:</b>	(10% of setting + 20ps)

##### TWO INSTRUMENTS SYNCHRONIZATION

<b>Initial Skew:</b>	20ns + 0 to 8 SCLK
<b>Offset Control:</b>	0 to Waveform length
<b>Offset Resolution:</b>	4 SCLK increments
<b>Skew Control:</b>	-5ns to 5ns
<b>Skew Resolution:</b>	10ps

##### GENERAL

<b>Voltage Range:</b>	100VAC to 240VAC
<b>Frequency Range:</b>	50Hz to 60Hz
<b>Power Consumption:</b>	150VA
<b>Display Type:</b>	TFT LCD, 4 ", 320 x 240 pixels

##### Interfaces:

<b>USB</b>	1 x front, USB host, (A type); 1 x rear, USB device, (B type)
<b>LAN</b>	1000/100/10 BASE-T
<b> GPIB</b>	IEEE 488.2 standard interface
<b>Segment control</b>	2 x D-sub, 9 pin
<b>Dimensions:</b>	
With Feet	315 x 102 x 395 mm (WxHxD)
Without Feet	315 x 88 x 395 mm (WxHxD)

##### Weight:

Without Package	4.5kg
Shipping Weight	6kg

##### Temperature:

Operating	0°C to 40°C
Storage	-40°C to 70°C

##### Humidity:

Humidity:	85% RH, non condensing
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##### Safety:

Safety:	CE Marked, IEC61010-1
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##### EMC:

EMC:	IEC 61326-1:2006
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##### Calibration:

Calibration:	2 years
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##### Warranty (1):

Warranty (1):	5 years standard
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#### ORDERING INFORMATION

MODEL	DESCRIPTION
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SE5082	5GS/s Dual Channel Arbitrary Waveform Generator
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#### OPTIONS

DAC	DAC output
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DC	DC coupled output module
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#### ACCESSORIES

S-Sync Cable:	For multi-instrument synchronization
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W-Rack Mount:	19" Single Rack Mounting Kit
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Case Kit:	Professional Carrying Bag
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<b>Note:</b>	Options and Accessories must be specified at the time of your purchase.
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<sup>(1)</sup> Standard warranty in India is 1 year.